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In vivo and in *silico* Studies of the Neuroprotective Effect of Artemisinin in Prevention of Alzheimer's Disease in an Animal Model

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Abstract

Currently, artemisinin (ART) and many of its semisynthetic derivatives are considered as potential neuroprotectors. The effect of ART in an animal model of Alzheimer's disease (AD) induced by aggregated amyloidogenic peptide $A\beta_{1-42}$ was studied by electrophysiology and morphology analysis to detect changes in brain memory caused by activation of the entorhinal cortex as synaptic potentiation and depression as well as identifying a correlation with in silico studies of the direct interaction of ART with amyloidogenic peptides $5A\beta_{17-42}$ and $18A\beta_{9-40}$.

We have shown the preventive effect of ART in an animal model of AD. Electrophysiological studies showed that in the pre-injection of ART, there is an obvious and significant decrease in excitotoxicity, which precedes both depressor and excitatory post-stimulus effects, approaching normal, indicating its powerful protective effect. Protection was more effective in relation to the depressor sequence. Histo-morphological analysis showed that the preliminary injection of ART acts as a neuroprotective agent that prevents or slows down damage to brain tissue and also promotes the restoration of neurons and their environment.

The conducted in silico studies indicate the direct interaction of ART with amyloidogenic peptides $5A\beta_{17-42}$ and $18A\beta_{9-40}$ with high binding energies. At the same

time, ART can stop the formation and growth of the 18Aβ9–40 fibril, as well as destabilize the already formed amyloid, which correlates with in vivo studies.

Keywords: Alzheimer's disease, amyloidogenic peptides, peptides, memory

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